

(10)



Europäisches Patentamt

European Patent Office

Office européen des brevets

(11) Publication number:

0 183 059

A1

(12)

## EUROPEAN PATENT APPLICATION

(21) Application number: 85113547.5

(51) Int. Cl.<sup>4</sup>: A 41 D 13/00

A 62 B 23/02

(22) Date of filing: 24.10.85

(30) Priority: 24.10.84 US 664374

(43) Date of publication of application:  
04.06.86 Bulletin 86/23(84) Designated Contracting States:  
AT BE CH DE FR GB IT LI LU NL SE

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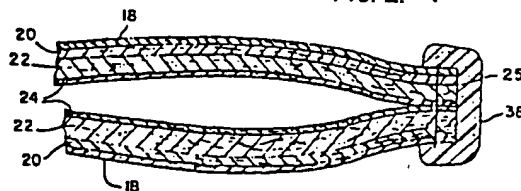
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(54) Fold-flat disposable respirator.

(57) A multiple ply, fold-flat, disposable respirator (10) having, as one ply, a layer of a toxic gas or vapor absorbing material (22). Another ply (20) is an aerosol filter. The respirator (10) has an intumed vertical seam (25) covered with a strip (38) of foamed elastomer.

FIG. 2.



1 In view of the above, the more easily carried  
fold-flat type disposable pocket respirator is attractive  
to workers and suppliers alike. However, such devices,  
5 of which those of U.K. Patent 1,588,442 and U.S. Patents  
Nos. Des. 249,072 and 4,248,220 are exemplary, lack  
the ease of application to the face and conformity  
to the face provided by the more conventional rigid  
cup-formed and frame-supported devices. The ability  
10 to conform to the shape of the face provides both comfort  
and a good seal with the face, around the periphery  
of the respirator. In particular, the device of U.K.  
1,588,442 has a horizontal seam which terminates in  
corners which contact the face in a manner detrimental  
15 both to comfort and to the objective of forming a good  
seal of the respirator against the face. Additionally,  
complicated pleating, stitching, riveting and other  
assembly procedures needed to produce prior art folded  
respirators render them relatively difficult and costly  
to produce.

20 Further, there exists a need in the art for  
a comfortable, disposable respirator having the ability  
to absorb toxic gases and vapors. Heretofore, relatively  
bulky respirators carrying a cartridge of some type  
have been employed for this purpose.

25 In view of the foregoing, an objective of the present  
invention is to provide an improved fold-flat respirator. This object  
is solved by the respirator according to the main claim. Further ad-  
vantageous features are evident from the subclaims. The invention also  
provides a method of making such fold-flat respirators.

30 The invention provides for a simple and economical mass  
production of the respirators, more particularly by use of a continu-  
ous multy-ply layered web of disposable material.

The invention further provides an end product offering  
exceptional face-fitting and breathing comfort with optimum air  
35 filtering efficiency.

The present invention still further provides a comfortable,  
fold-flat, disposable respirator having the capability of absorbing  
toxic gas or vapor.

1 web 14 and superimposed on the four layers 18, 20,  
22 and 24 constituting left web 16 in the manner depicted  
together in Fig. 2. The vertical seam 25 is then formed  
by stitching together the two webs at edges opposite  
5 28 and 30, e.g., with a nylon thread. A foam rubber  
strip 38 having a pressure sensitive adhesive layer  
is folded over the vertical seam 25 and pressed into  
place. The whole assembly is then turned inside-out  
and the edges 28 and 30 are separately stitched together  
10 with a binder strip 39 folded over same. The binder  
strip 39 may be, for example, a woven polyester/cotton  
blend, although almost any type of binder strip will  
suffice and may optionally be dispensed with entirely.

15 Almost any flexible or elastomeric foam material  
may be used as strip 38. One such suitable foam material  
is a polyurethane/polyester blend available from Rogers  
Foam Corp., Somerville, MA (Catalog No. RFI-261-100PPI-  
ZWHITE) which, as sold, has a pressure sensitive adhesive  
layer. The foam strip serves the dual purpose of prevent-  
20 ing the inturned vertical seam 25 from rubbing the  
face and providing an enhanced seal at the bridge of  
the nose and the chin.

The outer protective layer 24 requires a  
material capable of withstanding direct handling abuses  
25 but having a porosity permitting easy passage of inhaled  
and exhaled air. Nonwoven or woven fabrics may be  
used. A nonwoven mesh of polyester fibers with a heat-  
sealable binder of polyvinyl chloride may be used,  
such as is commercially available from the New Milford  
30 Nonwoven Corp. (Catalog No. C-310, a calendered material  
on the order of 0.254 mm in thickness). The primary  
functions of layer 24 are protection (encapsulation)  
of the absorbing layer 22 and structural support for  
the body of the respirator. Layer 24 is also color  
35 coded to indicate the type of service intended, e.g.,  
blue for HF.

1 Scrim 18 which engages the face when worn  
may comprise a soft highly porous web or mesh of poly-  
propylene. A suitable commercially available product  
5 is SNOWPRO Style #440-0827 polypropylene filter media  
.8 oz/sq. yd. supplied by Snow Filtration Company  
of Cincinnati, Ohio, U.S.A.

The preferred embodiment disclosed herein  
provides protection against HF fumes, silica dust and  
silica mist.

10 It should be understood that in the combination  
of materials selected for plies 18, 20, 22 and 24 one  
or more of those plies may be an open-celled flexible  
foam, rather than a fabric.

15 It should be understood that while the above  
mentioned materials and sources of supply will provide  
for successful practice of the invention, this information  
is not to be taken as limitive or in any sense restrictive  
to the invention. Those skilled in the art will readily  
20 appreciate that various other commercially available  
or specially prepared synthetic and/or natural fiber  
mediums, webs, meshes, shells or scrims may be obtained  
or produced and used.

Referring more particularly to the shape  
of respirator 10, it can be seen from Figs. 1, 3 and  
25 4 that special curvilinear edge contours 28 and 30  
have been selected to provide a comfortable substantially  
airtight seal about the nose and mouth when respirator  
10 is positioned for wearing and held by elastic headbands  
32, 34. Headbands 32 and 34 are attached to the respir-  
30 ator by staples 27 to provide a connection which will  
hold in high temperatures, e.g., temperatures on the  
order of 140°F (60°C) found inside aluminum smelting plants.

An attached malleable chevron 36 facilitates  
fitting and maintaining fit of the respirator over  
35 the nose. The chevron may be formed of a strip of  
aluminum or its equivalent and cemented in place, straddl-  
ing the vertical seam 25 which approximately bisects  
same.

1 FOLD FLAT DISPOSABLE RESPIRATOR

Claims

5 1. A fold-flat, disposable respirator (10) comprising:

a pair of multiple layered webs (14, 16) of flexible air-permeable materials, each web comprising a layer of an aerosol filtering material (20) and a layer of a toxic gas absorbing material (22), said webs (14, 16) each having one curvilinear edge portion (28, 30) for mating with facial contours and said webs (14, 16) being joined together at a common seam (25) which is vertical as worn; and

15 means (32, 34) for holding said respirator (10) open against a wearer's face.

20 2. The respirator of claim 1 wherein said filtering material layer (20) and said absorbing material layer (22) both comprise a lofty, fibrous, non-woven fabric.

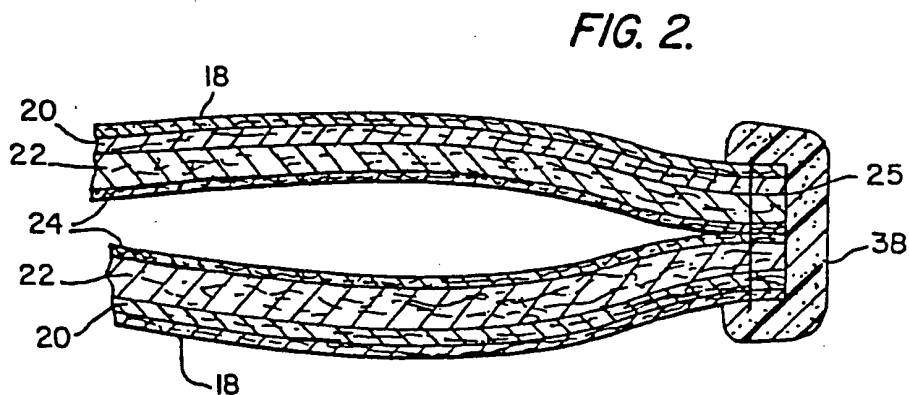
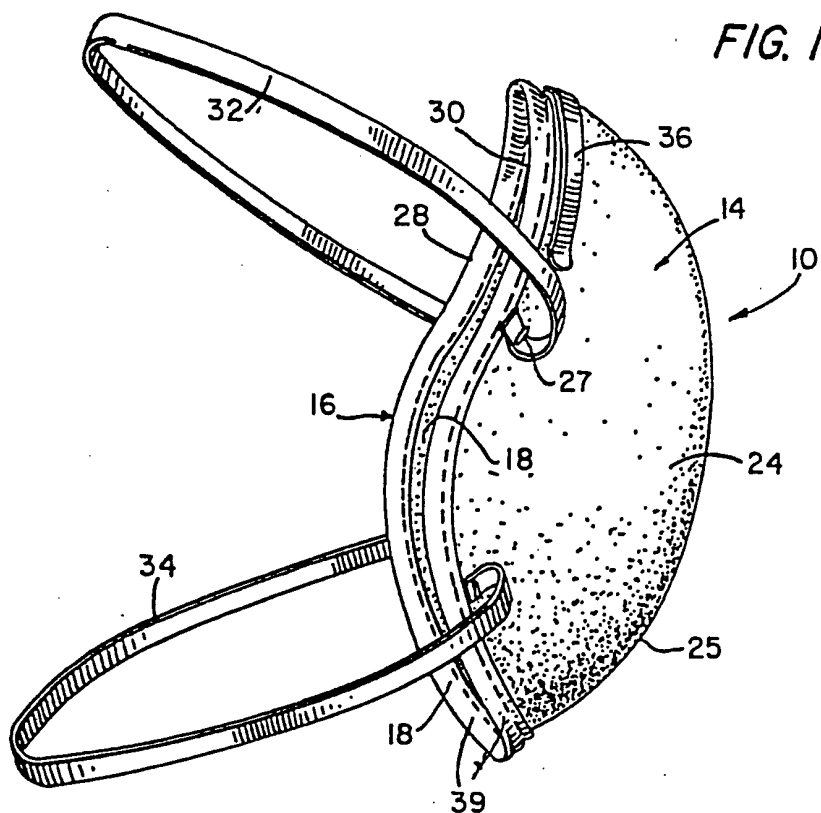
3. The respirator of claim 1 or 2 wherein each of said webs (14, 16) comprises:

25 an inner, soft fabric liner (18) for contact with the face;

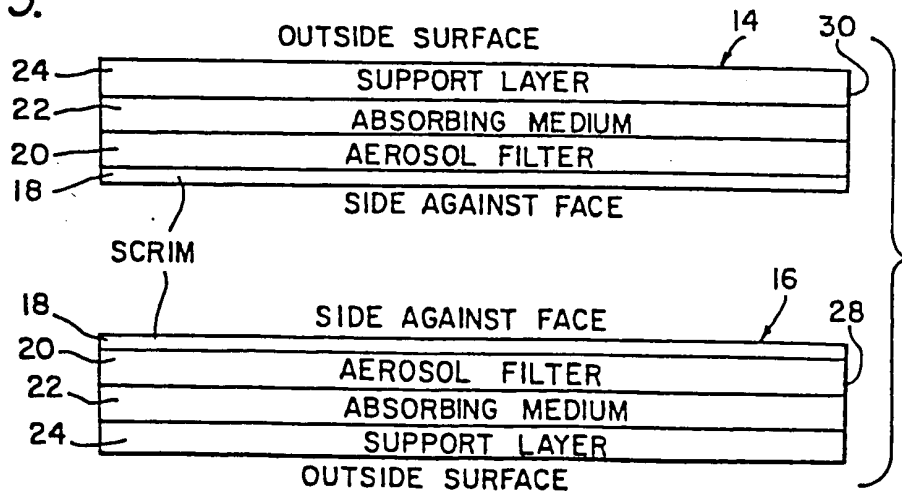
an intermediate layer (22) of a fibrous batt impregnated with a solid, particulate absorbent for toxic gas;

30 an outer covering layer (24) serving to protect said intermediate layers (22).

35 4. The respirator of one of claims 1 to 3 further comprising a strip (36) of deformable material spanning said vertical seam (25), which strip (36) may be bent to conform to the shape of the bridge of the wearer's nose.



**FIG. 5.**





DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	FR-A-2 373 294 (G.M.P. GOHIN) * Pages 4,5; figures 4,5 *	1-6	A 41 D 13/00 A 62 B 23/02
A	--- US-A-3 613 678 (D.J. MAYHEW) * Columns 4,5; figure 2 *	1-6	
A	--- FR-A-2 167 060 (P. COLLIGNON) * Pages 2,3; figures 1,2 *	1,4-6	
A	--- US-A-4 271 834 (TANAKA) * Columns 2,3; figures 2,3 *	1,2	
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			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			A 41 D A 62 B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 31-01-1986	Examiner WOHLRAPP R.G.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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